International Journal of

CONTROL

Editor: A. G. J. MACFARLANE, F.R.S.

Consultant Editor: A. T. FULLER

Editorial Board:

Sweden -	-	-	-	-	Professor K. J. ÅSTRÖM
Netherlan	ds	-	-	-	Professor P. EYKHOFF
U.S.A.	-	-	-	-	Professor YU-CHI HO
U.S.A.	-	-	-	-	Professor T. KAILATH
Japan -	-	-	-	-	Professor H. KIMURA
U.S.A.	-	-	-	-	Professor A. J. LAUB
U.S.A.	-	-	-	-	Professor C. T. LEONDES
U.K	,	-	-	-	Professor D. Q. MAYNE
U.K		-	-	-	Professor H. H. ROSENBROCK, F.R.S.
West Ger	ma	ny	-	-	Professor DrIng. M. THOMA
U.K		-	_	-	Professor J. H. WESTCOTT, F.R.S.

Volume 43

January 1986 to June 1986



Subscription Information

Published monthly Annual subscription 1986 £325 DM 1300 US \$690 ISSN 0020-7179

Dollar rates apply to USA, Canada and Mexico. Deutschmark rates to FR Germany. Sterling rates apply to the UK and all other areas.

All subscriptions are payable in advance and all rates include postage. Journals are sent by air to the USA, Canada and Mexico, India and Australasia. Subscriptions are entered on an annual basis, i.e. from January to December. Payment may be made by sterling cheque, dollar cheque, international money order or National Giro, or by credit card (AMEX, VISA, Mastercard/Access).

Orders originating in the following territories should be sent direct to the local distributors:

Australia R. Hill & Son Ltd, 117 Wellington Street, Windsor, Victoria 3181.

India Universal Subscription Agency Pvt. Ltd, 101-102 Community Centre, Malviya Nagar Extn Post Bag No. 8,

Saket, New Delhi 110017.

Japan Kinokuniya Company Ltd, Journal Department, PO Box 55 Chitose, Tokyo 156.

New Zealand R. Hill & Son Ltd, Private Bag, Newmarket, Auckland 1.

USA, Canada and Mexico
UK and all other territories
Taylor & Francis Inc., 242 Cherry Street, Philadelphia, Pennsylvania 19106–1906.
Taylor & Francis Ltd, Rankine Road, Basingstoke, Hampshire RG24 0PR.

Air freight and mailing in the USA by Publications Expediting Inc., 200 Meacham Avenue, Elmont, New York 11003. Second class postage paid at Jamaica, New York 11431. US Postmaster: Send address changes to *International Journal of Control*, Publications Expediting Inc., 200 Meacham Avenue, Elmont, New York 11003.

Published by Taylor & Francis Ltd, 4 John Street, London WC1N 2ET, UK. Printed by Taylor & Francis (Printers) Ltd, Rankine Road, Basingstoke, Hampshire RG24 0PR, UK.

CONTENTS OF VOLUME 43

NUMBER 1—JANUARY

	PAGE
A hamiltonian formulation of risk-sensitive linear/quadratic/gaussian control. P. WHITTLE and J. KUHN	1
Least-squares, Yule-Walker, and overdetermined Yule-Walker estimation of AR parameters: a Monte Carlo analysis of finite-sample properties. P. STOICA R. FRIEDI ANDRE and T.	1
SODERSTROM	13
The kepstrum method for spectral analysis. J. F. BARRETT and T. J. Moir	29
Symmetric systems: structure of the state space. J. Lewis, R. McCasland and C. Martin	59
Solving rational matrix equations in the state space with applications to computer-aided control-system design. A. K. Packard and S. S. Sastry	65
Conditioned invariant subspaces, disturbance decoupling and solutions of rational matrix equations. Z. Li and S. S. Sastry	91
On the existence of finite-dimensional compensators for retarded and neutral systems. H. LOGEMANN	109
Laguerre series approach to the analysis of a linear control system incorporating observers. DH. Shih, FC. Kung and CM. Chao	123
Shifted-Chebyshev-series analysis and identification of time-varying bilinear systems. JH. CHOU and IR. HORNG	129
Analysis and identification of Hammerstein model non-linear delay systems using block-pulse function expansions. FC. Kung and DH. Shih	139
On the similarity transformation in the design of an adaptive observer for multivariable systems. N. Hori, P. N. Nikiforuk and K. Kanai	149
A robust indirect adaptive-control approach. G. Kreisselmeier	161
Output-error identification methods for partially known systems. S. Dasgupta, B. D. O. Anderson and R. J. Kaye	177
Extended limiting forms of optimum observers and LQG regulators. Y. Halevi and Z. J. Palmor.	193
Discrete-time markovian-jump linear quadratic optimal control. H. J. CHIZECK, A. S. WILLSKY and D. CASTANON	213
The inverse problem of linear optimal control for constant disturbance. TT. Lee and GT. Liaw	233
Exact linearizations of input-output systems. L. R. Hunt, M. Luksic and R. Su	247
An algorithmic method for the simplification of linear dynamic scalar systems. J. PAL A design method for a self-tuning regulator for a distributed-parameter system.	257
E. WATANABE, T. YAMAMOTO and S. OMATU	271
Explicit solutions to the singular discrete finite-time linear estimation problem. U. SHAKED and B. PRIEL	285
Kalman filter estimation of electrical machine parameters. J. M. Freeman, F. N. Hassan and D. Morton.	305
The stability of the grey linear system. C. S. Zhou and J. L. Deng	313
On the stability of time-delay systems: new results. A. HMAMED	321
A necessary and sufficient condition for the positive-definiteness of interval symmetric matrices. ZC. SHI and WB. GAO	325
Correspondence	
Comments on 'Fixed modes and local feedbacks in interconnected	222
systems'. S. K. Lehmann	329
Announcement	335

NUMBER 2—FEBRUARY

	PAGE
The multiple linear quadratic gaussian problem. N. T. Koussoulas and C. T. Leondes	337
Optimal H robustness and the relationship to LQG design problems. M. J. GRIMBLE	351
Numerical fixed-point solution for near-optimum regulators of linear quadratic gaussian control problems for singularly perturbed systems. Z. GAJIC.	373
On the minimization of sensitivity to additive disturbances for linear-distributed parameter MIMO feedback systems. L. Pandolfi and A. W. Olbrot	389
A quantitative design method for MIMO linear feedback systems having uncertain plants. O. YANIV and I. M. HOROWITZ	401
Bounds for the eigenvalues of the solution of the discrete Riccati and Lyapunov equations and the continuous Lyapunov equation. J. GARLOFF	423
On a numerical method of solving the Lyapunov and Sylvester equations. M. B. Subrahmanyam	433
Approximating reachable sets for a class of linear control systems. J. E. GAYEK	441
Stability conditions of delay-differential systems. A. HMAMED	455
A new model for neutral delay-differential systems. Y. YAMAMOTO and S. UESHIMA	465
A heuristic control strategy for non-linear reaction-diffusion equations. J. I. RAMOS	473
A cost-function approach to stabilization by output feedback. C. B. Soh, C. S. Berger and K. P. Dabke	485
Multivariable root-locus behaviour and the relationship to transfer-function pole–zero structure. M. C. SMITH	497
Output dead-beat controllers and function dead-beat observers for linear periodic discrete-time systems. O. M. Grasselli and S. Longhi	517
Design of digital PI + dynamic controllers using projective controls. J. A. C. Meo, J. V. MEDANIC and W. R. PERKINS	539
Analysis of the identification of closed-loop systems using least-squares methods. E. P. L. AUDE and D. J. SANDOZ	561
Feedback systems and multiple time-scales. R. SILVA-MADRIZ	587
Globally stable and exponentially convergent adaptive control. D. JANECKI	601
Discrete Walsh polynomials in the optimal control of linear digital time-varying systems. IR. HORNG and SJ. HO	615
Two-filter formulae for discrete-time non-linear bayesian smoothing. Y. Bresler	629
On the absolute stability of multivariable non-linear systems using a block-tridiagonal state-space representation. P. RESENDE, E. KASZKUREWICZ and L. HSU	643
Stabilization of non-linear singularly perturbed systems with a periodic input. A. M. STEINBERG.	
Stability of discrete-time bilinear systems with constant inputs. Ch. Gounaridis-Minaidis and N. Kalouptsidis	663
The design of robust control systems for plants with recycle. O. TAIWO	671
A feedback oscillator model for circulatory autoregulation. A. M. DE PAOR and P. TIMMONS	
Synthesis of a stabilizing control problem for a multimachine power system with phase shifter. H. Kaizu and T. Taniguchi	
LQG controller synthesis with plant and noise spectral uncertainties. CC. KUNG and BS. CHEN	1
A systematic method for eigenstructure assignment and application to response shaping M. A. Khan and N. Sreenivasulu	
	,1,
Correspondence Further comments on 'A simple criterion for stability of linear discrete systems'. T. Mori	. 737

NUMBER 3—MARCH

Robust stabilization of linear multivariable systems: relations to approximation. K. GLOVER	741
Stability analysis of interval matrices: another sufficient condition. R. K. YEDAVALLI	767
Closed-loop properties of the infinite-time linear-quadratic optimal regulator for systems with delays. K. UCHIDA and E. SHIMEMURA	773
Algebraic Riccati equation and symplectic algebra. L. E. FAIBUSOVICH	781
On parametric state feedback design. G. ROPPENECKER	793
James Clerk Maxwell's Cambridge manuscripts: extracts relating to control and stability—V. A. T. FULLER	805
Model reduction of diagonally dominant systems. M. B. Argoun	819
Proper stable Bezout factorizations and feedback control of linear time-delay systems. E. W. Kamen, P. P. Khargonekar and A. Tannenbaum	837
Theorems on the bounds of solutions of semi-state models. V. B. Bajić and M. M. Millić	859
Optimal stochastic adaptive control with quadratic index. HF. CHEN and L. Guo	869
Tensor operators and limit cycles in non-linear systems. S. P. BANKS	883
On the optimal control of bilinear systems and its relation to Lie algebras. S. P. Banks and M. K. Yew	891
Design of a controller for a multivariable system with varying parameters using the extended direct Nyquist array. P. T. KIDD	901
A performance criterion. V. Zakian	921
The Sylvester resultant with applications to systems over rings. SY. ZHANG	933
Constrained controllability of discrete-time systems. R. P. VAN TIL and W. E. SCHMITENDORF	941
A pole-assignment problem for 2-dimensional linear discrete systems. KW. E. CHU	957
Diagonal stabilization of linear multivariable systems. A. N. Güçlü and A. B. Özgüler	965
On the loop transfer recovery. H. KAZEROONI and P. K. HOUPT	981
Analytic solution for a class of linear quadratic open-loop Nash games. H. Abou-Kandil and P. Bertrand	997
Robustness properties of discrete-variable structure controllers. HP. OPITZ	1003
Optimal design of control systems with large plant uncertainty. TP. TSAI and TS. WANG	1015
Coupling measures between modes and state variables in power-system dynamics. A. M. A. HAMDAN	1029

NUMBER 4—APRIL

	PAGE
Stability of dithered non-linear systems with backlash or hysteresis. C. A. DESOER and S. M. SHAHRUZ	1045
Canonical transformation for a class of time-varying multivariable systems. C. C. NGUYEN	1061
State-space realizations at infinity. D. J. Cullen	1075
On performance criteria. V. Zakian	1089
Gain-phase structures for linear multivariable systems. D. H. Owens	1093
Strong consistency of a class of recursive stochastic gradient algorithms. M. A. Hersh and M. B. Zarrop	1115
Identification of the external input of distributed-parameter systems by the boundary-element approach. K. Ohnaka and K. Uosaki	1125
James Clerk Maxwell's Cambridge manuscripts: extracts relating to control and stability—VI. A. T. FULLER	1135
A generalization of some structural results to interconnected systems. P. FESSAS	1169
The matrix partial realization problem: an algebraic approach. T. SHAMIR	1177
Synthesis of robust tracking systems with specified transfer matrices. T. YOSHIKAWA, T. SUGIE and H. HANAFUSA	1201
Near-decoupling of linear multivariable systems. M. B. Argoun	1215
Design of a digital PID stand-alone single -loop controller. M. R. Sтолс́ and T. B. Petrović	1229
Feedback control of uncertain systems: robustness with respect to neglected actuator and sensor dynamics. G. Leitmann, E. P. Ryan, and A. Steinberg	1243
Adaptive one-step-ahead control subject to an input-amplitude constraint. A. N. PAYNE	1257
On controlling generalized state-space (descriptor) systems. V. Lovass-Nagy, D. L. Powers and HC. Yan	1271
Application of general orthogonal polynominals to the optimal control of time-varying linear systems. YF. CHANG and TT. LEE	1283
Controllability of non-linear delay systems. A. S. C. SINHA	1305
Normality, scaling and eigenvalue inclusion regions. R. F. HARRISON and B. KOUVARITAKIS	1317
Correspondence Comments on 'The stability of linear time-varying systems'. Y. Q. Sun	1337
Simple methods for the shift-transformation matrix, direct-product matrix and summation matrix of discrete Walsh series. JH. CHOU	1220
and IR. Horng	1339

NUMBER 5—MAY

	PAGE
Time-optimal control strategy for saturating linear discrete systems. WS. Lin	1343
Distributed system transfer functions of exponential order. F. M. CALLIER and J. WINKIN	1353
Application of general discrete orthogonal polynomials to optimal-control systems. TT. LEE and YF. TSAY	1375
Determining dynamic output feedback of the least order for SIMO systems to locate poles in a specified region. S. K. DUDA	1387
On minimality and stable minimality of time-varying linear systems with well-posed boundary conditions. I. GOHBERG and M. A. KAASHOEK	1401
Transfer function synthesis using frequency response data. A. H. WHITFIELD	1413
Dead-beat control with robustness. Y. Zhao and H. Kimura	1427
Optimum choice of moving sensor trajectories for distributed-parameter system identification. E. RAFAJŁOWICZ	1441
A multi-model adaptive predictor for stochastic processes with Markov switching parameters. QI XIAO-JIANG	1453
Relations between coefficients of the closed-loop characteristic polynomial and output-feedback gains. K. J. Reinschke	1465
Pulse response evaluation of a non-linear system. A. H. FALKNER	1487
State-feedback control of non-linear systems. S. H. ŻAK and C. A. MACCARLEY	1497
Positivity properties in pencils of matrices. W. C. WATERHOUSE	1515
Local input-output decoupling of discrete-time non-linear systems. J. W. GRIZZLE	1517
Trigonometric approximation of optimal periodic control problems. K. Styczeń	1531
Some further results concerning matrices with elements in a polynomial ring. M. G. Frost and M. S. Boudellioua	1543
On the deterministic performance of uncertain dynamical systems. Y. H. CHEN	1557
New sets of stability criteria as a generalization of Markov's stability theorem. K. HORIGUCHI, S. HAYASHI and N. HAMADA	1581
James Clerk Maxwell's Glasgow manuscripts: extracts relating to control and stability. A. T. FULLER	1593
Correspondence	
Further comments on 'Comments on "On an estimate of the decay rate for stable linear delay systems". T. Mori	1613

NUMBER 6—JUNE

	PAGE
Necessary and sufficient stability conditions for the case of dependent additive perturbations. B. KOUVARITAKIS and H. LATCHMAN	1615
Adaptive sliding controller synthesis for non-linear systems. JJ. E. SLOTINE and J. A. COETSEE	1631
Adaptive control of delay system. K. ICHIKAWA	1653
Filtered inverse systems. T. Yoshikawa and T. Sugie	1661
A direct approach using the shifted Legendre series expansion for near optimum control of linear time-varying systems with multiple state and control delays. C. Hwang and MY. Chen	1673
An application-oriented, optimization-based methodology for interactive design of engineering systems. W. T. NYE and A. L. TITS	1693
Disturbance decoupling by measurement feedback with stability for infinite-dimensional systems. R. F. Curtain	1723
ARMA models, their Kronecker indices and their McMillan degree. M. R. Gevers	1745
Sequential decomposition of the matrix Riccati equation and its application to the linear quadratic regulator problem. E. SOROKA and U. SHAKED	1763
Solution of two-point-boundary-value problems by generalized orthogonal polynomials and application to optimal control of lumped and distributed parameter systems. RY. CHANG and SY. YANG	1785
Quantitative feedback theory for multiple-input-multiple-output feedback systems with control input failures. I. HOROWITZ and A. IOINOVICI	1803
Self-tuning control application to a nuclear power plant. G. T. PARK	1823
Model-structure selection by cross-validation. P. Stoica, P. EYKHOFF, P. Janssen and T. Söderström	1841
General orthogonal polynomials approximation of the linear-quadratic-gaussian control design. YF. CHANG and TT. LEE	1879
Direct approach for the optimal control of linear time-delay systems via shifted Legendre polynomials. MH. Perng	1897
On the necessary condition for discrete-time pole-assignability by piecewise constant output feedback. T. Hagiwara and M. Araki	
Subject Index	
Author Index	1917